

# California High-Speed Rail Authority



RFP No.: HSR 14-32

## Request for Proposals for Design-Build Services for Construction Package 4

### Book I, Part C.1 - Scope of Work

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## Part C.1 Scope of Work

This Scope of Work covers the technical aspects of the Project. Other requirements are delineated elsewhere in the Contract Documents. Contractor shall refer to the General Provisions for a list of general terms, acronyms and definitions.

### 1.0 California High-Speed Rail Project Standards and Manuals

Technical documents are provided to the Contractor for direction and assistance during the Project's final design and construction, including but not limited to the following documents.

- a. Design Criteria Manual – Mandatory design criteria requirements the Contractor shall follow and apply in the development of final design and construction documents, inclusive of any updates that may be issued via RFP addendum. (Book III, Part A)
- b. Directive Drawings – Mandatory design criteria in a graphical format the Contractor shall follow and apply to ensure consistency during design for system-wide elements and features, inclusive of any updates that may be issued via RFP addendum. (Book III, Part B)
- c. CADD Manual – Mandatory drawing standards and format that the Contractor shall follow and apply in the preparation of design, construction and as-built drawings. (Book IV, Part F.1)
- d. Plans Preparation Manual – Mandatory plans format that the Contractor shall follow and apply in the preparation of design and construction submittals and as-built drawings. (Book IV, Part F.2)
- e. Aesthetics Manual for Non-Station Structures – Mandatory aesthetic principles that the Contractor shall follow and apply to the design of non-station structures. (Book IV, Part C.5)
- f. Design Variance Request Procedure – Mandatory procedure that the Contractor shall follow and apply in the identification, preparation and submittal of Design Variance requests, as necessary to achieve approval. (Book IV, Part E.2)
- g. Geotechnical Baseline Report for Bid (GBR-B) – Mandatory document(s) that the Contractor shall use as the basis of its Proposal. The GBR-B shall not be used for final design. The GBR-B is representative of the preliminary geotechnical investigations and interpretations performed to date by the Authority. (Book IV, Part G.1)
- h. Preliminary Ground Motions Guidelines – Preliminary ground motion data that the Authority has prepared and Contractor shall use in seismic and structural design included in the Proposal. (Book IV, Part C.4)
- i. Cost and Scheduling Controls Program – Describes the schedules to be prepared by the Contractor and the software to be utilized to generate Project Schedules in critical path



method (CPM) format (the “CPM schedule”) using the latest version of Primavera P6, or as otherwise specified by the Authority. (Book IV, Part D.1)

- j. Safety and Security Management Plan – Defines the process for identifying, evaluating and resolving safety hazards and security vulnerabilities associated with the Project prior to the start of revenue service and includes construction safety and security requirements. Requires the Contractor to be responsible for safety and security certification activities during the final design and construction phases of the Project, compile and submit a Safety and Security Certification Package, update and expand a Certifiable Elements and Hazards log. (Book IV, Part D.5)
- k. Master Quality Plan – Defines the Contractor's responsibilities for developing and implementing a Quality Management System. (Book IV, Part D.2)
- l. Mitigation Monitoring and Enforcement Plan (MMEP) – Defines the Contractor's responsibilities for implementing or monitoring and reporting mitigation measures as specified in the MMEP. Contractor is responsible for overseeing Project mitigations and verifying that mitigation measures are properly carried out. (Reference Materials, Part E)
- m. Reliability, Availability, and Maintainability Requirements – Defines the Contractor's responsibility to design, build and document the Project to achieve the required reliability, availability, maintainability and accessibility of the Work. (Book IV, Part D.6)
- n. Verification, Validation and Self-Certification Procedures – Procedures to guide the Contractor in developing and implementing a verification and validation (V&V) process to confirm to the Authority that by examination and provision of objective evidence the technical contract requirements (verification) and the particular requirements for specific intended use (validation) have been fulfilled. (Book IV, Part E.1)
- o. Basis of Design Policy – Policy document prepared by the Authority that defines the major components and performance objective of the CHSR System, as defined in the Basis for Design Guidelines. Contractor shall use this document in the preparation of designs to ensure consistency with the components, objectives, processes, requirements and assumptions governed by Authority policy. (Book IV, Part C.3)
- p. Record of Survey and Control Monument Data – Survey control data that the Authority has completed to date and Contractor shall use in its topographic survey and mapping for its design. (Book IV, Part G.2)
- q. Primavera Settings – Contractor's Schedule CP 4 – Establishes Primavera schedule settings required by the Contractor to establish common settings between the Master Project Schedule and the submission for integration by the Contractor.
- r. Construction Specifications Preparation Manual – Establishes mandatory standards that Contractor shall follow and apply to promote consistency in the preparation of Construction Specifications and as-built Construction Specifications throughout the CHSR System. (Book IV, Part F.3)



- s. Standard Specifications – Technical specifications for use in Authority construction contracts provided for Contractor's use in preparing its Construction Specifications. (Reference Materials, Part A)
- t. Standard Drawings – Standard project elements for use in the construction of the California High-Speed Rail System, as determined applicable by the Contractor. Standard Drawings are not considered mandatory for this project. However, if the Contractor chooses to use a Standard Drawing, the design as shown on that drawing shall be followed. (Reference Materials, Part A)
- u. Environmental Compliance Program Manual (Reference Materials, Part E)

## 2.0 Preliminary Engineering Documents

Preliminary Engineering Documents have been prepared to support environmental assessment and approval and demonstrate technical feasibility and constructability. To the extent Contractor makes use of the Preliminary Engineering Documents in any manner, Contractor shall review and validate that the documents meet the Design Criteria, Directive Drawings, local jurisdictional authorities' design criteria, the Final Environmental Documents, Governmental Approvals, any subsequent or supplemental CEQA/NEPA documentation and/or Supplemental or Amended Governmental Approvals, and/or other requirements before advancing design to a baseline level (refer to the "Design Services" clause ([Section 4.2](#))).

The following Preliminary Engineering Documents are provided to the Contractor for reference:

- a. PE4E Design – Preliminary design prepared by the Authority with the intent of supporting state and federal environmental review and approval.
- b. PE4P Design – Proposed preliminary design prepared by the Authority with the intent of demonstrating technical feasibility and constructability:
  - i. Existing Composite Utility Plans
  - ii. Non-Standard and Complex Structures Plans
- c. Preliminary Technical Reports – Technical reports prepared by the Authority to document data collection efforts completed to date and document the basis of the design for the proposed preliminary design and environmental documents:
  - i. Floodplain Impacts Assessment
  - ii. Hydraulics and Hydrology Report
  - iii. Stormwater Management Report
  - iv. Geotechnical Data Report
  - v. Geologic and Seismic Hazards Report
  - vi. Utility Impacts Report
  - vii. Advance Planning Study



- viii. Preliminary Right-of-Way Requirements Report
- ix. PE4P Constructability Assessment Report
- x. PE4E Design Baseline Report
- xi. PE4P Structures Report

The above-identified Preliminary Technical Reports can be found in the Reference Materials. The Preliminary Engineering Documents are based on preliminary design efforts and investigations and are provided for reference, unless otherwise specified for specific elements in the Contract Documents.

- d. Electronic Files – Available electronic files used in the preparation of the preliminary design documents:
  - i. ALG Design Files
  - ii. Digital Terrain Model (DTM) Files
  - iii. Cross Sections
  - iv. Existing Utility Data
  - v. Topographic Mapping
  - vi. Photogrammetric Data
  - vii. PE4E Preliminary Design Plan DGNs
  - viii. PE4P Existing Utility Relocation Plans DGNs
  - ix. Non-Standard and Complex Structures Plans DGNs

### 3.0 Project Description and Limits

Construction Package 4 is located within the counties of Tulare and Kern. It is composed of three alignment subsections:

- Allensworth Bypass (A1)
- Poso Creek (L1)
- Wasco-Shafter (WS1)

The Preferred Alternative is shown in Figure 1 as identified in the Fresno-Bakersfield FEIR/FEIS and NOD/ROD.

CP 4 is bounded by one mile north of the Tulare-Kern County line to the north and Poplar Avenue to the south.

Major work elements include construction of at-grade, retained fill and aerial track sections of high-speed rail, relocation of existing BNSF tracks for approximately four miles, crossings of existing BNSF railroad tracks, construction of waterway and wildlife crossings and roadway reconstructions, relocations and closures.





Refer to Attachment 1 (Limits and Extents of Work Table) and Attachment 2 (Limits of Work Map) for additional information. General Project limits, from north to south, are described below:

A1: One mile north of the Tulare-Kern County line to south of Elmo Highway

L1: South of Elmo Highway to south of Whisler Road

WS1: South of Whisler Road to just north of Poplar Avenue

Description and major elements of each segment are described in the following sections.

### **3.1 Alignment Subsection A1**

This alignment subsection is immediately south of Construction Package 2-3 (HSR 13-57). It is approximately nine miles in length and runs nominally at-grade bypassing the town of Allensworth to the west. The alignment starts one mile north of the Tulare-Kern County Line and ends at Elmo Highway to the south.

Major construction elements for this alignment subsection include civil works for at-grade track sections, three grade separations at Garces Highway, Pond Road, and Peterson Road, realignment of local roads including but not limited to Scofield Avenue and Magnolia Avenue. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.2 Alignment Subsection L1**

This alignment subsection is approximately three miles in length. The alignment runs nominally at-grade from south of Elmo Highway to Sherwood Avenue. Approaching Sherwood Avenue, the alignment begins to ascend into a retained fill section for approximately 1.5 miles. As it approaches Taussig Avenue, the alignment transitions back to at-grade converging with BNSF railroad and SR 43 on the west through the end of the subsection.

Major construction elements include civil works for the at-grade sections, retained fill section, and Poso Creek Bridge which is subject to seasonal construction constraints. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.3 Alignment Subsection WS1**

Alignment Subsection WS1 is approximately nine miles in length. The alignment runs nominally at-grade parallel to the BNSF railroad on the west side for approximately 2.4 miles before it transitions to an elevated track section. In the vicinity of SR 46, the alignment begins its transition from an at-grade track section to a 2.2 mile elevated track section and crosses over BNSF railroad near Jackson Avenue, where the alignment crosses over and runs parallel to the BNSF railroad on the east. North of Kimberlina Road, the alignment begins its transition from an elevated track section back to an at-grade section where it continues at-grade for approximately 3.2 miles, ending north of Poplar Avenue.



Major work elements for this alignment subsection include civil works for the at-grade and aerial sections, three grade separations at McCombs Avenue, Kimberlina Road, Merced Avenue, realignment of local roads, and realignments of BNSF tracks between approximately 6th Street and Poso Avenue, Jackson Avenue and Merced Avenue. Additionally, a major structural element for consideration is the non-standard structure at the BNSF railroad crossing at approximately station WS1 5670+00.

Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.4 Limits of Work for Enabling Facilities**

As described above, the Contractor's Scope of Work includes a number of grade separations and associated roadway reconstructions, railroad relocations and utility works owned by Third Parties. These include, but are not limited to, California Department of Transportation (Caltrans), County of Tulare and Kern, Burlington Northern Santa Fe (BNSF) Railway, utility companies, Central Valley Regional Water Quality Control Board, State Water Resources Control Board, United States Army Corps of Engineers, flood control districts and other permitting agencies.

The Contractor shall be responsible for coordinating and confirming the limits of work described above to ensure conformance with the Final Environmental Documents, Governmental Approvals, subsequent or supplemental CEQA/NEPA documentation, Supplemental or Amended Governmental Approvals, Environmental Footprint, Environmental Constrained Footprint, local jurisdictional entity requirements, Third Party Agreements, direct coordination with the impacted third parties and other works required to support future CHSR elements through Interface Coordination and Design Integration Workshops with the Authority.

For new and existing structures not directly supporting CHSR track but having the potential to affect CHSR track or service, the following requirements shall be met:

- Foundations of abutments, columns and walls, slopes and other features requiring routine maintenance, such as expansion joints, bearings and in-span hinges, shall be located outside the Authority's access-prohibited ROW. Structural elements in or over the Authority's access-prohibited ROW, such as superstructure of an overhead structure or a utility bridge, shall be designed such that inspection and maintenance of these structural elements can be performed from outside the Authority's access-prohibited ROW or from within the Authority's access-prohibited ROW during non-operating hours of the HSR system.
- Maintenance access shall be connected to a public roadway.



As delineated in this Scope of Work, Contractor shall be responsible for coordinating these and all other design and location issues with the impacted Third Parties through final design and construction. These include but are not limited to the following items:

- i. Maintenance and access provisions as required by irrigation and flood control districts.
- ii. Compliance with the most recent and adopted general and/or long-range plans for/by Caltrans, counties of Tulare and Kern, and the cities of Wasco and Shafter.
- iii. Compliance with local and state regulations with regard to impacts to sensitive areas, such as campgrounds and schools.



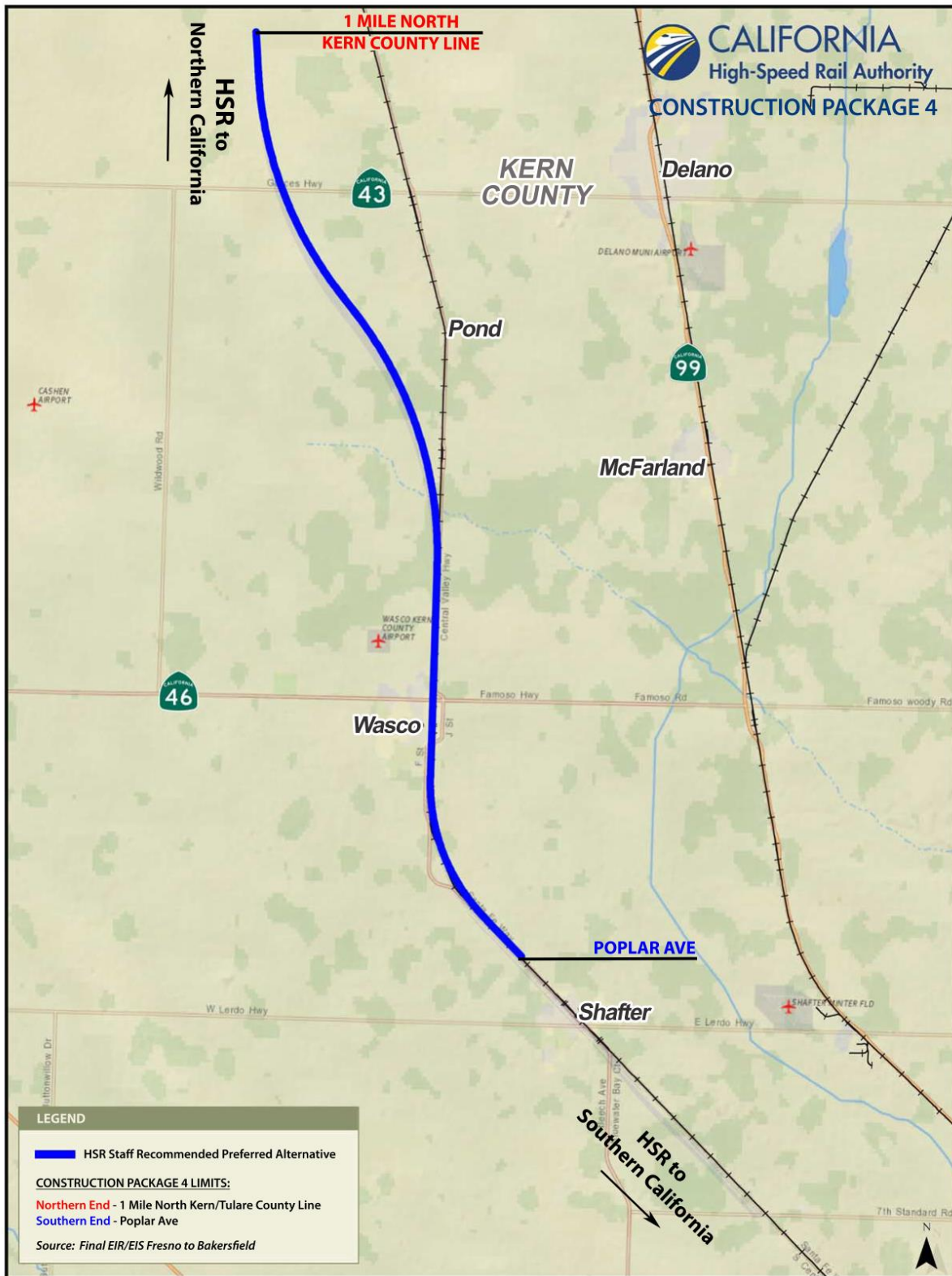


Figure 1: Construction Package 4 Alignment



## 4.0 Project Scope of Work

### 4.1 General

Contractor's Work is defined as all services, labor, materials, equipment, facilities and other efforts to be provided and performed by the Contractor including the following general categories:

- a. Project management and administration, including scheduling, cost control, reporting, material procurement and inspection.
- b. Utility Investigation, Coordination, Protection and Relocation.
- c. Demolition and Clearing of ROW.
- d. Code Assessment.
- e. Completing, Coordinating, Securing Approval and Executing Final Permitting and Utility Agreements.
- f. Survey and Mapping.
- g. Subsurface Investigations.
- h. Geotechnical Engineering and Seismology.
- i. Development and management of all management plans and manuals required by the Contract Documents.
- j. Design, engineering, and analysis, including but not limited to Final Design and Value Engineering.
- k. Estimating.
- l. Design, fabrication, installation and maintenance of all Project identification signs.
- m. Environmental Requirements, including obtaining all Governmental Approvals, as applicable within the limits of CP 4.
- n. Construction and installation, including management and supervision.
- o. Quality Control and Quality Assurance for Design and Construction.
- p. Community Relations including a comprehensive communications program to proactively interface with stakeholders regarding the design and construction of the Project in accordance with the "Public Involvement" clause (Section 53.0) of the General Provisions.
- q. Quality Inspection and Testing.
- r. Construction Safety and Security Program, including preparation, management and execution of plans and other elements required in the "Safety and Security" clause (Section 26.0) of the General Provisions.
- s. Preparation of CADD as-builts, inclusive of consolidated service drawings.



- t. Interface management in accordance with the Contract Documents, including interface Coordination for in-scope Works as well as future works by others.
- u. Coordination with Jurisdictional Authorities (governments, public and private entities such as utility companies, CPUC, FRA, Caltrans, etc.).
- v. Coordination with Adjacent Railroads (i.e., BNSF).
- w. Coordination with Local Communities.
- x. Coordination with Adjacent CHSR works.
- y. Provision of other related services associated with the design and construction of the Project and necessary to ensure the Project's ultimate readiness for high-speed passenger rail operations, including maintenance, servicing and repairs of all Contractor provided facilities and equipment until Final Acceptance. The Contractor shall maintain records of all preventative and corrective maintenance performed and make this information available to the Authority for review upon request.
- z. Coordination with all applicable Third Party agreements.
- aa. Performance of all required reviews, inspections, tests and demonstrations in accordance with the Verification, Validation and Self-Certification Procedures.
- bb. Preparation of an asset register from As-Built drawings.
- cc. Preparation of a utilities register.
- dd. Project documentation, including preparation, delivery and correction, as necessary, of all Contract submittals.
- ee. Provision of all bonds, insurance, Governmental Approvals, licenses (including but not limited to software licenses), guarantees and warranties, as required by the Contract.
- ff. All Work required under the guarantees and warranties of the Project.
- gg. All other project management activities and tasks required to satisfy all the provisions of the Contract.

The exceptions to this list include those efforts that the Contract specifies will be performed by the Authority or other Persons.

Contractor shall provide design and construction for CHSR trackway and civil infrastructure, complete in place.

Contractor shall identify, design, install and maintain a temporary protective layer over the trackway subgrade to protect the subgrade from degradation through the warranty period. Degradation refers not only to erosion of fill/existing soils as a result of rainfall and wind, but also to potential damage caused by animal burrowing, vandalism and other environmental factors (such as flooding) not evident at the time of construction.





Contractor shall design and install structural embedments such as anchor bolts, embeds, grounding and bonding, foundations, additional reinforcing steel, etc., as needed, in structures, walls and subsurface infrastructure to accommodate future CHSR systems components not in the Project scope.

Contractor shall design and construct enabling works, such as grade separations and intrusion protection, complete in place. The enabling work shall be coordinated, designed and constructed in accordance with the local jurisdictional entity (i.e., cities of Wasco and Shafter, counties of Tulare and Kern, Caltrans, railroads, etc.) but shall not undermine the design standards for the CHSR alignment located above or below said facility.

The Scope of Work does not include construction of CHSR trackwork (i.e., ballasted and non-ballasted section); passenger stations; new building construction; ROW engineering, negotiations and acquisition; soundwalls; and systems work (i.e., OCS poles, foundations and wires; traction power facilities; automatic train control; etc.).

Note that ROW engineering, negotiations and acquisition services are excluded from the Scope of Work. More definitive ROW availability and access information will be provided to the Contractor prior to NTP.

Contractor is further responsible for the following:

- a. Design and construction of the civil infrastructure elements as generally described above and identified in further detail in Attachment 3 (Scoping Typical Sections) and Attachment 4 (Scope Elements Matrix). The Work shall be performed and completed in accordance with the documents defined in Sections 1.0 and 2.0 of this Scope of Work, as well as agreements, design criteria, standards and permits by Third Parties for facilities within their jurisdictions. Contractor shall refer to the Project Work Elements (Section 5.0).
- b. Contractor's design and construction shall be completed such as to ensure the Project's ultimate readiness for high-speed rail passenger operations (Section 4.2.1.1).
- c. Accommodation of future CHSR elements and facilities to be designed and constructed by others that affect the civil infrastructure as identified in this Scope of Work and through the Interface Coordination and Design Integration Workshops, including but not limited to trackwork, traction power facilities, overhead contact system, automatic train controls facilities, communications, rolling stock, operations, maintenance access/emergency access/egress from trackway (ladders and stairs), future CHSR passenger stations and soundwalls.
- d. Preparation of design and construction submittals in accordance with this Scope of Work.
- e. Preparation of Construction Specifications in accordance with this Scope of Work.
- f. Coordination with Third Parties, including but not limited to, local, regional, state and federal agencies, railroads, utility companies and other permitting and regulatory agencies.
- g. Contractor's design and construction shall accommodate SunnyGem's operations and internal traffic circulation, inclusive of maintaining a minimum 16.5 foot vertical clearance



under any CHSR infrastructure, providing access to the existing loading dock, and accommodating STAA Standard truck turning movements.

#### **4.1.1 Project Management Plan**

The Contractor shall develop a Project Management Plan (PMP) within 30 days following issuance of NTP. The Contractor shall submit the PMP to the Authority for review and approval, and shall comply with the approved PMP. At a minimum, the PMP shall include the following:

- a. An organizational chart of all management personnel from Project Manager down to discipline leads and superintendent level, together with qualifications, responsibilities, and involvement of Key Personnel on the Project.
- b. A work breakdown structure (WBS) consistent with the WBS provided by the Authority, indicating the source and responsibility for completing each aspect of the work. The WBS shall be the basis for organizing all work for the Project, and shall be reflected in the organization of the Interim Schedule, Baseline Schedule and Current Baseline Schedule.
- c. A schedule for all major submittals to be provided to the Authority which shall be consistent with the Baseline Schedule.
- d. The approach to manage and oversee the design and construction, including interface management and system integrations for each major discipline of Work, as described in this Scope of Work in accordance with the "Interface Coordination and Design Integration" clause (Section 55.0) of the General Provisions.
- e. An approach to how the community and stakeholder outreach will be conducted, and how it will relate to the key design and construction milestones. The approach to community and stakeholder outreach shall be further detailed by the Contractor in accordance with the requirements of the "Public Involvement" clause (Section 53.0) of the General Provisions.
- f. Additional sections consistent with Section 2.2.3 of the Federal Transit Administration Project and Construction Management Guidelines.

#### **4.2 Design Services**

In order to ensure close coordination and oversight of the design work between the Contractor and the Authority, the Contractor's Design Manager and core design team consisting of design leads for key disciplines shall be co-located on site with the Contractor's and Authority's management personnel. Other design personnel may be required to attend meetings on site for over the shoulder reviews, comment resolution meetings, and other technical discussions as required.

##### **4.2.1 Review of Design Criteria, Drawings, Reports and Specifications**

Contractor is responsible for review of the Design Criteria, Preliminary Engineering Documents, including Drawings and Reports, Standard Drawings, Directive Drawings and Standard Specifications, for completion of design and construction of the Project.





#### **4.2.1.1 Design Criteria**

Design Criteria has been prepared to direct the development of Contractor's final design, construction drawings and construction specifications for the Project. Contractor shall develop the alignment using the Design Criteria to achieve a desired design speed of 250 mph.

Contractor shall document the applicability assessment in the RVTM, including identification of each criterion that is determined by the Contractor to not be applicable to the Project. RVTM is described in more detail in VV&SC Procedures in Book IV, Part E1.

Contractor shall review the Design Criteria and determine applicability of each criterion. If a local jurisdiction's design criterion for its facilities or other work within its jurisdiction differs from the Design Criteria, the Contractor is responsible for resolving these differences and providing the local jurisdiction the necessary documentation to satisfy its criteria, while remaining in compliance with the Design Criteria in the Contract.

Contractor shall refer to the Design Criteria Manual and the Design Variance Request Procedure in Book III, Part A and IV, Part E.2, respectively, for definition on criteria thresholds and the Design Variance process, respectively. Design Variance Requests are location-specific. Design Variance Requests are subject to Configuration Management and Change Control. Refer to Design Variances (Section 4.14).

#### **4.2.1.2 Preliminary Engineering Documents: Drawings and Reports**

The Preliminary Engineering Documents are at various design levels and are provided for Contractor's reference.

Contractor shall review the Preliminary Engineering Documents and Technical Reports and confirm technical feasibility and constructability consistent with any Environmental Requirements and the applicable Design Criteria and Directive Drawings as described in this Scope of Work.

Contractor shall substantiate the technical feasibility and constructability of the design in the Design Baseline Report. This report will serve as a baseline document for configuration management and will be subject to change control.

Contractor shall be responsible for the preparation of Construction Drawings and Reports.

#### **4.2.1.3 Construction Specifications**

Contractor shall be responsible for the preparation of Construction Specifications.

Standard Specifications were developed to support design and construction and are provided for Contractor's use in preparing its Construction Specifications.

Contractor shall review Standard Specifications and determine applicability of each specification section to Contractor's final design and construction methods and determine what additional specifications are required. This review shall include the reference standards as referenced/included in the Standard Specifications. Contractor shall implement changes to the



Standard Specifications as necessary to suit the specifications to the Contractor's design and construction methodology.

The registered professional engineers who prepare the Construction Specifications, in signing and sealing the Construction Specifications, shall be responsible for the Construction Specifications suitability to the design and construction and compliance with all Contract provisions. Their responsibility shall encompass the Standard Specifications provisions incorporated in the Construction Specifications.

Construction Specifications shall be prepared in accordance with the Construction Specifications Preparation Manual. Contractor's submittals of the Construction Specifications, including the RFC submittal, shall include tracked changes versions of Standard Specifications sections to show the changes made to suit the Contractor's design and construction methodology. Additionally, the RFC submittal shall include a version with all changes accepted.

The Contractor shall require construction-phase submittals in its Construction Specifications sections similar to those listed in the Standard Specifications.

#### **4.3 Additional Data**

Contractor shall be responsible for obtaining additional data, including:

- a. Final identification, confirmation and potholing for existing utilities. The Contractor shall prepare and submit a register of all existing utilities located as part of the general works, in accordance with the Asset Information Requirements Manual. The Contractor shall submit electronic files of the utilities register in accordance with the Asset Information Requirements Manual.
- b. Survey and topographic mapping for final design, including site surveys as required. Available photogrammetric data used for preliminary design is provided for Contractor's reference.
- c. Collecting additional geotechnical information to complete the Project; support the finalization of ground motions work and fault rupture data; and prepare technical reports, including the GBR-C, construction drawings and construction specifications. Contractor shall store, maintain and make available its acquired geotechnical core samples until Final Acceptance and close out of Contract.

#### **4.4 Design and Code Analysis**

Contractor shall review and analyze current design, industry and regulatory design and construction codes, including those referenced in the Governmental Approvals and Final Environmental Documents and Third Party requirements for applicability to its design and construction of the Project.

Contractor shall identify applicable design, industry and regulatory construction codes by resource from the Governmental Approvals, Final Environmental Documents and by affected Third Parties in a Design and Code Analysis Report, which shall be submitted to the Authority.



Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.5 Certification Program**

Contractor shall be responsible for safety and security certification activities during the Final Design and Construction phases of the Project. Contractor shall develop and submit a Safety and Security Certification Plan that describes in detail how Contractor will identify, mitigate, verify, validate and certify safety and security requirements. The Safety and Security Certification Plan requirements are described in detail in the Authority's Safety and Security Management Plan in the Contract Documents. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.6 Interface Coordination and Design Integration**

Contractor shall be responsible for coordinating the interfaces and performing design integration with adjacent contractors, Third Parties and the Authority, as specified in the "Interface Coordination and Design Integration" clause (Section 55.0) of the General Provisions.

#### **4.7 Verification and Validation and Self Certification**

This section applies to Technical Contract Submittals only.

Contractor shall develop and implement a V&V process to confirm to the Authority that by examination and provision of objective evidence the Technical Contract Requirements and the particular requirements for specific intended use have been fulfilled.

With each and every Technical Contract Submittal to the Authority subject thereto, the Contractor shall provide a V&V submittal and Self-Certification demonstrating compliance with the Contract requirements and fitness for purpose.

Refer to the VV&SC Procedures of the Contract Documents for detailed VV&SC requirements.

The VV&SC Procedures located in Book IV do not apply to compliance with the Environmental Requirements. For information regarding environmental submittals, refer to the "Environmental" clause (Section 42.0) of the General Provisions.

#### **4.8 Value Engineering**

Contractor may initiate, conduct, complete and implement value engineering (also referred to as value analysis) upon approval of its Design Baseline Report. Prior to initiating any value analysis, the Contractor shall discuss such analysis with the Authority. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. Value engineering shall comply with the methodologies and procedures adopted by Caltrans, including but not limited to Project Development Procedures Manual, Chapter 19 – Value Analysis, Value Analysis Report Guide and Value Analysis Team Guide and shall be performed in coordination with the Authority. Contractor shall refer to the value engineering process requirements specified in the General Provisions.



Further Contractor-initiated value engineering opportunities can be initiated, conducted and implemented through final design and construction efforts.

## **4.9 Design Reports**

Contractor shall provide Design Reports to the Authority as specified in this Scope of Work, the Design Criteria and other mandatory documents included in the Contract Documents. Contractor shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions.

Unless otherwise noted, for Design Reports, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Contractor shall include in the baseline schedule each Design Report and Authority review period, including breakdown structure.

### **4.9.1 Design Baseline Report**

The purpose of the Design Baseline Report is to demonstrate the Contractor's compliance with the requirements of the Contract and demonstrate the intent and boundaries to advance the Work through final design. The Contractor shall prepare a Design Baseline Report that defines the major design elements to be progressed to design and construction and confirms technical feasibility, constructability and compliance with the approved Final Environmental Documents including the following:

- a. Final Track Alignment and Limits of Construction Activities
  - i. Plan and profile for the CHSR track alignment for the entire limits of the Project and location of all special trackwork. The limits of track alignment shall extend beyond Contractor's construction limits to the nearest point of tangency in plan and profile to ensure consistency, interface and integration requirements with future work and in full support of CHSR operations.
  - ii. Proposed design of the track bed shall not preclude the eventual design and installation of the ballasted or non-ballasted track sections listed in Table 1, unless local conditions or proposed changes warrant a more specific determination. All changes to proposed track sections are subject to the approval of the Authority.
  - iii. Typical sections for CHSR trackway for at-grade, grade separated structures and trenches, third party facilities, as well as facilities constructed by others that affect Contractor's design. Typical sections shall identify and address future traction power, overhead contact system, communications, train controls, operations and maintenance equipment. CHSR facilities by others shall be confirmed during the Interface Coordination and Design Integration Workshops. CHSR facilities by others shall be identified as "NIC" (Not in Contract) on the drawings.
  - iv. Embankment or alternative structure type may be provided subject to confirmation by the Authority of no change in ROW requirements for the Environmental Footprint or creation



of additional environmental impacts. The costs of Third Party approvals and additional permitting requirements shall be the responsibility of the Contractor.

- b. Trackside access - Trackside access driving gates shall be provided at Authority facility locations. If this cannot be provided due to site constraints, an alternative method of providing vehicular access to the trackside from the Authority facility shall be submitted to the Authority for review and approval as part of this Design Baseline Report.
- c. Clearances at Structures and Restricted Locations – Proper clearances in conformance with Design Criteria at all grade separations and future CHSR facilities by others that affect the design, including substation locations, radio antenna sites, special trackwork, signal houses, access and egress and location of the system's undertrack ductbank and manholes.
- d. Structure Plans, Elevations and Typical Sections – For grade separated structures, viaducts, bridges, trenches, tunnels and retaining walls. Drawings shall include preliminary nominal dimensions of the structures subject to final design calculations.
- e. Railroads – For relocation of, or modification to, existing railroad trackways and other facilities per agreements with such entities.
- f. Utilities – Relocation of utilities within Authority's and State and local jurisdictions' ROW in accordance with applicable State and federal regulations.
- g. Geometric Approval Drawings – For relocation of, or modification to, State highway facilities and local roadways, as agreed with the affected third party agency.
- h. Stormwater Pollution and Protection Plan (SWPPP) and Best Management Practices (BMP).
- i. Consistency with Final Environmental Documents and Governmental Approvals – Describing whether and to what extent the Baseline Design remains consistent with the Project described in the Governmental Approvals and Final Environmental Documents, including any environmental analysis provided therein. The Authority reserves the right to withhold approval of the Design Baseline Report until the Environmental Compliance Plan has been approved.
- j. Aesthetic Design and Review for Non-Station Structures – Refer to Aesthetic Design and Review for Non-Station Structures Report requirements as delineated elsewhere in this Scope of Work.
- k. Future systems works – Contractor shall demonstrate provisions for future NIC systems elements such as traction power system (TPS), overhead contact system (OCS), communications, train control, operations and maintenance facilities and elements as specified in this Scope of Work. Contractor shall include within these demonstrated provisions a layout plan and sections, inclusive of foundations, to validate the future installation of these systems per the requirements established in the Design Criteria and as communicated to the Contractor during the Interface Coordination and Design Integration Workshops. The 30'-0" nominal distance for future OCS pole foundations on aerial structures shall also apply to proposed retained fill sections. Contractor shall make provisions at 30'-0" nominal distance for future OCS cantilever arm installation at trench



walls greater than or equal to 20' in height above TOR. Further coordination shall take place during the Interface Coordination and Design Integration Workshops.

I. Other information that establishes the baseline for the Project.

Design variances and VECPs that have not been approved shall not be included in the Design Baseline Report.

Contractor shall prepare a Design Baseline Report, submit for review, coordinate comment resolution and ensure approval of the Design Baseline Report by the Authority within 180 days of NTP. The Authority's review period for the Design Baseline Report is 20 Working Days.

Drawings shall include dimensions that demonstrate the intent and boundaries of the design to be advanced into final design. Design assumptions for elements identified as future CHSR facilities by others will be provided by the Authority for incorporation into the Design Baseline Report documents and reviewed with Contractor during the Interface Coordination and Design Integration Workshops.

Upon receipt of approval, the Design Baseline Report will be subject to the Authority's configuration management and change control process.

#### **4.9.2 Hydrology and Hydraulics Reports**

Contractor shall prepare Hydrology and Hydraulics Reports to support the drainage design of the full build-out of the CHSR trackway, as well as the temporary drainage system for the interim condition.

Contractor shall contact and coordinate with State and local jurisdictions to obtain necessary information for preparation of its reports.

#### **4.9.3 Geotechnical Reports**

The Contractor shall perform geotechnical investigations, perform analysis and interpret all geotechnical data to finalize its design and prepare a GBR-C. The GBR-C is a mandatory document and shall be submitted to and approved by the Authority prior to beginning of construction. The Contractor shall prepare the GBR-C based on information contained in the Geotechnical Data Report and additional soil borings and other data prepared by the Contractor. The Contractor may prepare and submit its GBR-C report(s) in a phased fashion. Along with the associated final design plans and specifications, the GBR-C shall serve as the basis for design and construction of the Project elements. Refer to the Design Criteria for additional information.

Upon approval, the GBR-C and associated final design plans and specifications shall serve as the basis for design and construction of the Project elements. The Contractor may prepare and submit its GBR-C report(s) in a phased fashion in accordance with the Contractor's design approach and construction means and methods. Authority's review period for the GBR-C is 20 Working Days.





Contractor shall also prepare a Geotechnical Data Report and Geotechnical Engineering Design Reports to support its design calculations and requirements for design and construction of the full build-out of trackway and trackwork, embankment, excavation, soundwalls, retaining walls, trenches, tunnel structures, grade separations, roadways and all other facilities constructed by the Contractor or to be constructed by others per the requirements of the Design Criteria as well as the requirements of State and local jurisdictions. These Geotechnical Reports shall include and address additional geotechnical explorations performed by the Contractor through its design and construction phases.

Contractor shall prepare and submit a Geotechnical Investigation Plan to the Authority prior to commencement of the field work, which shall be subject to VV&SC in accordance with the VV&SC Procedures. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. If Contractor proposes to use investigation methods and/or frequencies that differ from the guidelines set forth in the Design Criteria, a variance for the proposed alternate investigation plan(s) shall be submitted to the Authority for approval prior to commencement of the field work. Contractor's attention is further directed to Section 4.14 concerning Design Variance Requests, as well as Sections 4.3, 4.9.4 and 5.10 for related design efforts.

Contractor shall contact and coordinate with State and local jurisdictions to obtain all necessary information for preparation of its reports.

#### **4.9.4 Load Rating Reports**

The Contractor shall perform load rating analyses and provide a load rating report for HSR Primary Type 1 aerial structures and qualifying culvert structures below the high-speed rail in accordance with FRA requirements. The Contractor shall perform load rating analyses for Primary Type 2 structures and qualifying culvert structures for vehicular traffic and submit a load rating report in accordance with FHWA and Caltrans requirements. The electronic input files used for the analysis software shall be provided to the Authority for future use.

#### **4.9.5 Type Selection Reports**

Contractor shall prepare and submit a Type Selection Report for each CHSR structure and structure not directly supporting CHSR track but having the potential to affect CHSR track or service. The Type Selection Report(s) will be subject to Authority approval. A Type Selection meeting for each structure shall be scheduled with the Authority after approval of Design Baseline Report and a minimum of 10 Working Days following receipt of the Type Selection Report. At the Type Selection meeting the Contractor shall present the proposed structure and shall discuss issues pertinent to the section of the structure type, including but not limited to foundation type, geotechnical issues, hydrology/hydraulics, scour protection, construction, seismic design, aesthetics, traffic handling, track-structure interaction, system facilities supported from the structure, and maintenance access considering HSR operations. As part of the Type Selection Report(s), Contractor shall include the following reports:



- a. Type Selection Memo (Type Selection Memo shall be subject to approval as part of the Type Selection Report Submittal) – Any unique design features or future maintenance requirements should be covered within the memo.
- b. Major Reports (Major Reports, as listed below, shall be subject to approval as part of the Type Selection Report Submittal)
  - i. Seismic Analysis and Design Plan (Design Criteria, Section 11.3)
  - ii. Track-Structure Interaction Design and Analysis Plan (Design Criteria, Section 12.6.1)
  - iii. Complex and Non-Standard Aerial Structures Load Path Report (Design Criteria, Section 12.8.7)
- c. Supporting Reports (Contractor shall have secured Authority concurrence on the applicable sections of the Supporting Reports listed below prior to inclusion in the Type Selection Report Submittal):
  - i. Hydrology and Hydraulics Reports (Section 4.9.2)
  - ii. Geotechnical Reports (Section 4.9.3)
  - iii. Aesthetic Design and Review for Non-Station Structures Report (Section 4.9.6)

Within 5 Working Days after a type selection meeting for each structure, the Contractor shall submit a meeting summary addressing comments raised at the meeting. Authority's review period for the Type Selection Report(s) is 15 Working Days following receipt of the meeting summary.

Type Selection Reports for other jurisdictional authorities such as Caltrans, cities, counties, and railroads shall comply with requirements of that jurisdiction. Contractor shall coordinate with these jurisdictional authorities and obtain their written approval prior to the design and construction of these structures. Contractor's attention is directed to Sections 4.10 (Preparing Construction Drawings and Construction Specifications for Third Party Facilities) and Section 4.12 (Third Party Design Submittals).

#### **4.9.6 Aesthetic Design and Review for Non-Station Structures Report**

As the Project takes form, a consistent system-wide image is expected through the introduction of common elements by the Contractor associated with selected bridges and overpasses. Curvilinear forms are to be adopted for the following reasons:

- a. Image: Recognizable, consistent bridge and overpass forms can contribute toward establishing an aesthetic image for the CHSR.
- b. Structural Precedents: Curvilinear forms such as arches and trusses have been successfully implemented for medium-span high-speed rail bridges internationally.
- c. Materials: Either concrete or steel would be appropriate materials. Designers have the latitude to propose materials, details, connections, abutments, etc.





Interfaces between major bridges, overpasses and adjacent aerial structures shall be carefully and systemically coordinated by the Contractor to ensure smooth and appropriate transitions in accordance with the aesthetic design guidance (Aesthetic Manual for Non-Station Structures), as well as any Environmental Requirements pertaining to aesthetics.

Contractor shall adhere to such aesthetic design guidance to implement aesthetic design and visual resource mitigations and enhancements to structures. The Aesthetic Design and Review for Non-Station Structures Report shall describe Contractor's approach to implementing these mandatory guidelines.

Structures and other elements included in CP 4 for aesthetic design and review preliminarily include (subject to confirmation by the Contractor in its coordination as required herein) CHSR aerial structures, CHSR bridges, roadway overpasses, retaining walls, local street lighting, access control fence and intrusion protection barrier. At a minimum, basic aesthetic improvements shall include, but not be limited to the following requirements:

- a. There shall be consistency and unity between the HSR bridges throughout the construction section.
- b. Box girder shapes shall have smooth soffits and angling or curved exterior girder sides that portray smooth and softened appearance, regardless of the selected method of construction.
- c. The profile of spans between the support columns shall have a positive, upward camber, or slight arching for long spans.
- d. Where structurally feasible, the number of structure elements, such as visually distinctive column caps, shall be minimized within the aerial structure. Where structurally necessary, these elements shall be integrated to achieve proper proportions and balance between the elements, including the aesthetic integration between single and multiple column bents used within a specific aerial structure or structures.
- e. Column profiles shall include aesthetic features such as flares or shapes that are coordinated with the box girder superstructure.
- f. In urban areas, exposed wall surfaces and columns shall be finished with approved finishes that include cast-in-patterns and textures based on local preferences and/or historical characteristics.
- g. Exposed pipes, ducts, cables, etc. shall not be permitted. Where these elements are required, they shall be concealed inside the structure, in recesses or with coordinated covers.
- h. Aesthetic character should be an integral element of structural design, rendering surface finish treatments unnecessary. Finishes shall be applied only where structural material requires protection, i.e., steel structures.
- i. Where steel is selected as the primary structural material, coating colors shall harmonize with adjacent structures and with the surrounding physical setting. Colors are aesthetic features and will be subject to final approval by the Authority.



#### **4.9.7 Certifiable Elements and Hazards Log**

Contractor shall update, expand and submit in-progress submittals of the Certifiable Elements and Hazards Log on a quarterly basis through the Design and Construction phases of the Project. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. Hazards associated with each certifiable element that can reasonably be expected to occur within the Contractor's Scope of Work shall be identified by the Contractor on the Certifiable Elements and Hazards Log as defined in the Authority's Safety and Security Management Plan.

#### **4.9.8 Safety and Security Certification Package**

Contractor shall compile and submit a Safety and Security Certification Package when all Certifiable Items Lists for a particular element or infrastructure component are completed for the applicable Quality Milestone payment. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. The Safety and Security Certification Package shall consist of a signed Certificate of Conformance for the Project element; all completed Certifiable Items Lists, a completed Certifiable Elements and Hazards Log (Refer to Section 4.9.7) and all supporting documentation such as hazard analysis, drawings and design element descriptions.

#### **4.9.9 Final Design Report**

Contractor shall prepare and submit a Final Design Report that includes all changes and revisions made to the Design Baseline Report. This report shall be supported by all variances and design exceptions including Value Engineering Change Proposals approved by the Authority or third parties that support the changes to the Design Baseline Report. The Final Design Report shall represent a conformed configuration of the design. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.10 Preparing Construction Drawings and Construction Specifications for Third Party Facilities**

Contractor shall be responsible for preparation of the complete design, and certification that construction drawings, construction specifications, reports and calculations meet the requirements of the Authority and Third Parties.

The Project includes modification of facilities owned by Third Parties and construction in and around facilities owned by Third Parties.

The Contractor shall identify the design and construction requirements and codes of affected Third Parties, and document the requirements and codes in the Design and Code Analysis Report. The Contractor shall perform this assessment taking into account all executed agreements, draft agreements, or agreement language in process, as provided by the Authority. If a Third Party prepares the design for its facilities, Contractor shall be responsible for coordinating and reviewing such design to ensure conformance with Contractor's design and construction efforts per the Contract requirements.



#### 4.11 Design Submittals

Contractor shall provide design submittals to the Authority as specified in this Scope of Work, the Design Criteria and other mandatory documents included in the Contract Documents.

Unless otherwise noted, for design submittals, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Contractor shall include in the Baseline Schedule each design submittal and Authority review period, including breakdown by structure.

Contractor shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions, Plans Preparation Manual and the CADD Manual.

At minimum, submittals shall identify the following:

- a. Location (CP 4);
- b. Preparer and date;
- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number;
- f. Main point of contact, phone number and company contact details; and
- g. Facilities Identification Number.

Contractor shall provide the following submittals to the Authority:

1. Design Reports:
  - Design Baseline Report (subject to Authority approval as noted in Section 4.9.1).
  - Design and Code Analysis Report.
  - Aesthetic Design and Review for Non-Station Structure Report (as part of Design Baseline Report).
  - Value Engineering Report.
  - Hydrology and Hydraulics Reports.
  - Geotechnical Reports.
  - Structures Reports including Type Selection Reports.
  - Certifiable Elements and Hazards Log (quarterly, in-progress submittals).
  - Final Design Report.
  - Safety and Security Certification Package.
  - Other technical reports as delineated in the Design Criteria and this Scope of Work.



## 2. Construction Drawings:

- Nominal 60 percent design, all sheets represented.
- Nominal 90 percent design, all sheets included.

Civil and Structure Construction Drawings may be submitted in segments or by structure and shall include identification of future facilities by others for reference as determined in the Interface Coordination and Design Integration Workshops. These include facilities for traction power, OCS, communications, train controls, location of special trackwork and CHSR facilities by others, and shall be identified as NIC.

## 3. Construction Specifications:

- Nominal 60 percent: an outline of Construction Specifications shall be submitted.
- Nominal 90 percent: all applicable Construction Specifications shall be submitted. Construction Specifications Submittal tracked changes versions shall be in Microsoft Word format. All other electronic design files shall be in PDF format.

## 4. RFC Submittals (subject to Authority approval as noted in Section 4.13):

- Electronic Submittal Files (certified as representing the designs in the Construction Package). Drawing Submittals shall be in accordance with the CADD Manual and Plans Preparation Manual. Construction Specifications Submittal tracked changes versions shall be in Microsoft Word format. All other electronic design files shall be in PDF format.
- Engineering Calculations (certified as representing the designs in the Construction Package).

## 5. Survey Reports (signed and sealed) as defined in the Design Criteria and Construction Specifications.

## 6. Technical Contract Submittal List identifying Technical Contract Submittal requirements per the Contract Documents. The Contractor shall submit the Technical Contract Submittal List to the Authority for SONO within 30 days following issuance of NTP. The Contractor shall submit an updated and expanded Technical Contract Submittal List to the Authority for SONO with the nominal 90 percent Construction Specifications and RFC Construction Specifications. An updated list shall include Construction-Phase Submittals that are proposed for SONO or approval.

### 4.12 Third Party Design Submittals

Contractor shall provide Third Party submittals to the respective Third Party and a copy to the Authority unless otherwise noted. Contractor shall be responsible for determining and providing submittal quantities required by Third Parties.

Submittals shall identify the following information:

- a. Location (CP 4);
- b. Preparer and date;



- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number; and
- f. Main point of contact, phone number and company contact details.

Contractor shall include in the baseline schedule each Third Party submittal and review period. Contractor shall apply VV&SC as described in the VV&SC Procedures. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Upon Third Party approval of Third Party Submittals, Contractor shall forward a copy of the approval to the Authority for information.

#### **4.12.1 Caltrans Project Reports**

The Contractor shall prepare Caltrans Project Report(s) for the CHSR facilities that affect the State Highway System. The Contractor shall obtain Caltrans approval of the report(s) during its design phase and prior to its 90% design submittal of such CHSR facilities.

#### **4.13 Ready for Construction (RFC) Submittals**

Contractor shall provide RFC submittals to the Authority and receive the Authority's approval prior to constructing any portion of the Project. Authority's review period for RFC submittals is 20 Working Days. Contractor's attention is directed to the "Prerequisites for Start of Construction" clause (Section 3.2) and the "Effect of Oversight, Reviews, Tests, Acceptances and Approvals" clause (Section 61.2) of the General Provisions.

Submittals shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions and the CADD Manual.

Submittals shall identify the following information:

- a. Location (CP 4);
- b. Preparer and date;
- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number; and
- f. Main point of contact, phone number and company contact details.

Contractor shall provide the following submittals to the Authority:

1. Construction Drawings.
2. Construction Specifications.
3. Engineering Calculations (certified as representing the designs in the Construction Package).



4. Electronic Submittal Files.
5. Testing and Acceptance Plans.
6. Safety and Security Certification Package.
7. Construction Phase Submittal List identifying all construction phase submittal requirements per the Contract Documents.

Contractor shall include in its Baseline Schedule each submittal, including breakdown by section or structure.

#### **4.13.1 Ready for Construction Submittals Prior to Final Design**

This section sets forth the requirements under which certain portions or elements of the Project may be packaged by the Contractor to initiate construction for certain discrete portions or elements of the Project prior to final design. These requirements shall apply to any Work that is performed by the Contractor prior to completing the overall final design. All such Work is performed at the sole risk of the Contractor.

The Contractor, as the designer and builder of the Project, is the party at risk and shall be responsible for design errors, inconsistencies, omissions and conflicts within the design that may cause the Work to be interrupted or changed during the course of construction.

The Contractor may at any time propose a procedure to initiate the start of construction prior to final design at Contractor's sole risk for selected structures or structural element(s) that are critical to the timely completion of the Project. This procedure shall be coordinated with and subject to Authority's concurrence.

If the final design documents for the Project require changes to the Work performed by the Contractor as described herein, the Contractor shall make such changes to the Work, including removal and replacement if necessary, at its sole cost and expense and shall not be entitled to any extension of Completion Deadlines or adjustment in the Contract Price.

#### **4.14 Design Variances**

Design Variances may be included for specific conditions and locations based on preliminary engineering studies. No Design Variances have been approved by the Authority for CP 4. Any Design Variances approved by the Authority prior to the Proposal Deadline will be identified in a Design Variance Report, which will be issued via an addendum to the RFP, when and if they are approved by the Authority. Final approval of any Design Variances included in a Design Variance Report will occur upon Contractor's Design Variance Request submittal(s) during final design, if still applicable.

Contractor shall review any Design Variance Report and determine if design modifications can be incorporated into the Design Baseline Report to achieve the Design Criteria and not require a Design Variance. Regardless of previous approvals during preliminary engineering studies, Contractor shall submit a request for each preliminary and/or new Design Variance needed to support design and construction. Contractor shall obtain final approval of Design Variances prior



to incorporation of a Design Variance into the Project. Design Variance Requests are subject to the Authority's change control process. Authority's review period for the Design Variance Request is 20 Working Days.

Contractor shall not assume that additional Design Variance Requests will be approved beyond any included in the Design Variance Report or those additional Design Variances that may be submitted and approved by the Authority as part of an ATC.

Contractor shall refer to the Design Criteria and the Authority's Design Variance Request Procedures for definition on Design Variance process and criteria thresholds, respectively.

All Design Variances are subject to the provisions of Section 4.15.6. All Design Variances that constitute a Variation shall be subject to all the Environmental Re-Examination Process(es), as required by the "Environmental" clause (Section 42.0) of the General Provisions.

#### **4.15 Construction Services**

Contractor shall provide construction services including but not limited to those described below.

##### **4.15.1 Safety and Security**

Contractor shall be responsible for all work-site safety and security activities. Contractor shall prepare and submit a Site-Specific Health and Safety Plan and Site-Specific Security Plan as described in the Authority's Safety and Security Management Plan. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

##### **4.15.2 Hazardous Material Handling**

Contractor shall remove and dispose of all Hazardous Material in accordance with the General Provisions.

##### **4.15.3 Utility Work and Coordination with Utility Companies**

Contractor shall be responsible for utility work as delineated in the General and Special Provisions. Coordination with utility companies shall be conducted as described in the Design Criteria, agreements and other requirements specified in the Special and General Provisions.

##### **4.15.4 Construction-Phase Submittals**

Construction-phase submittals are defined as those submittals required under the Construction Specifications, such as shop drawings, product data, samples, installer qualification statements, manufacturer's instructions and source and field quality control submittals.

The Contractor shall identify all submittals required under its Construction Specifications in a list (Construction-Phase Submittals List) along with an indication of whether those submittals shall be submitted to the Authority for SONO or information. The list itself shall be submitted to the Authority for SONO.





Prior to any excavation work for trenches of five feet or more, the Contractor shall be required to submit its procedures and plans for temporary excavation support and protection for SONO. The submittal shall include a written procedure, along with detailed drawings of the proposed excavations and excavation support systems; design calculations and related documents prepared, signed and sealed by an independent civil or structural engineer currently registered in the State of California; and the certification for the professional engineer that prepared the drawings with a resume highlighting the required experience in design of shoring systems.

Contractor shall prepare construction-phase submittals, including shop drawings in accordance with Contractor's Construction Specifications.

Construction-phase submittals shall be subject to self-certification. As part of the Contractor's self-certification, the Contractor's engineer as defined in Standard Specifications Section 02 01 00, Standard Specifications General Statements, shall confirm that the design intent is being met and that the submittal is in compliance with the Contract requirements. Contractor shall comply with Attachment 5 (Construction-Phase Submittals).

#### **4.15.5 As-Builts**

Contractor shall prepare and submit as-built drawings, signed and sealed, in accordance with CADD and Plans Preparation Manuals. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. As-built drawings shall fully reflect the final, completed, as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. As-built plans shall include Consolidated Service Drawings that fully address utility services designed and constructed by the Contractor and/or others in support of the Project. The Contractor shall survey the installed utilities to verify the actual placement.

The Contractor shall prepare and submit as-built specifications, signed and sealed in accordance with the Construction Specifications Preparation Manual. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. As-built specifications shall fully reflect the final, completed, as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. Contractor shall submit electronic files of As-Built Specifications (with tracked changes) and original marked up as-built specifications (hard copies).

Contractor shall prepare and submit as-built construction-phase submittals. As-built construction-phase submittals shall fully reflect the final, completed, as-built condition. Changes from such submittals shall be documented in accordance with the processes required for construction-phase submittals, including VV&SC.

#### **4.15.6 Environmental**

As set forth in and subject to the "Final Environmental Documents and Governmental Approvals" clause (Section 7.7) of the General Provisions, Contractor shall be responsible for complying with and implementing the Environmental Requirements. Contractor is expected to





review Environmental Requirements, verify against the Scope of Work, and submit a list of all mitigation related measures and features as part of the Environmental Compliance Plan to allow the Authority to verify completeness and concurrence with the list. Requirements for environmental compliance are outlined in the Environmental Compliance Program Manual.

#### **4.15.7 Asset Register**

The Contractor shall prepare and submit a register of all assets installed in accordance with the Asset Information Requirements Manual. The register shall fully reflect the final, completed, as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. The Contractor shall submit electronic files of the asset register in accordance with the Asset Information Requirements Manual.

## **5.0 Project Work Elements**

The following is a summary of major work elements of the Project. For a more comprehensive list of Work Elements refer to Attachment 3 (Scoping Typical Sections) and Attachment 4 (Scope Elements Matrix) of this Scope of Work.

### **5.1 Demolition, Clearing and Grubbing of the Construction Site**

The Contractor is responsible for demolition of all existing structures within the limits of the Authority ROW, including costs for service disconnection fees, if any. Upon delivery of ROW by the Authority to the Contractor, the Contractor shall remove all existing structures, Third Party facilities and the relocated waterways and utilities and any other improvements within the limits of Authority ROW, and the Contractor shall clear and grub the entire Authority ROW, inclusive of excess land, Third Party facilities, waterways and utilities under the control of the Authority during construction. If a structure is partly within the limits of the Authority ROW and partly outside of the limits of the Authority ROW, the Contractor, in coordination with the Authority shall acquire the necessary rights prior to removal of the entire structure and its foundation. Contractor shall prepare and submit a demolition plan to the Authority prior to its demolition activities, which shall be subject to VV&SC as described in the VV&SC Procedures. The Authority will issue one of the three dispositions as described in the VV&SC Procedures. For recycling requirements, refer to the "Sustainability" clause (Section 44.0) of the General Provisions.

Removal, relocation and/or purchase of existing billboards, inclusive of supporting structures (i.e. poles), will be completed by others through the ROW Appraisal/Acquisition process (not-in-scope for Contractor). Contractor shall remove any remaining billboard foundations.

### **5.2 Subsidence Benchmarks and Surveys**

Upon being granted access to the Authority ROW, the Contractor shall locate and install survey benchmarks as per the information noted on the Directive Drawings. Survey benchmarks shall be located within the Authority ROW, spaced no greater than one mile apart and shall generally conform to the alignment and curvature of the HSR track. The survey benchmarks shall be placed generally following the track alignment, in positions that will remain accessible and will



not be impacted by construction of the HSR infrastructure or other in contract or planned future facilities. The survey benchmarks shall be placed in or near original grade or finished grade if the entire Authority ROW is re-graded. In addition, at least one survey benchmark shall be placed at all wayside facilities, such as traction power sites, passenger stations, maintenance facilities, radio tower sites, etc. The Contractor shall maintain, repair, and relocate (if necessary) all survey benchmarks until completion of the Project.

As survey benchmarks are established, a survey of each benchmark shall be performed in accordance with the Design Criteria Manual and Specifications. Additional surveys will be performed every six months documenting both vertical and horizontal movements of all benchmarks. These surveys will continue every six months until completion of the Project. All survey data shall be submitted to the Authority for its use.

### **5.3 Railroad Relocation and Reconstruction**

The Contractor shall prepare final design of the track alignment and the track bed including subballast for relocations of the BNSF track. The Contractor shall be responsible for the final design and relocation of utilities, demolition of all existing structures, clearing and grubbing, grading and constructing the track bed, subballast and ancillary Work such as drainage systems, including any defined environmental compliance and mitigations.

BNSF will be responsible for the final design of signaling and track structure covering ballast, ties and rail. Installation of ballast, track and signals for such relocations is the responsibility of BNSF.

The Contractor shall design and construct any industry owned sidings allowing BNSF to install the switch to the clearance point. To date, one industry siding has been identified at Mile Post 913.8. Other sidings are owned by BNSF and reconstruction is the responsibility of BNSF. Where the Contractor's Work may interfere with service to the siding, the Contractor shall coordinate with BNSF to conduct the work without disruptions to service.

After BNSF completes mainline construction and tie-ins and the property abandoned by BNSF has been transferred to the Authority, the Contractor shall demolish the existing railroad including removal of sidings, at-grade crossings and warning devices in accordance with CPUC abandonment procedures. The Contractor shall coordinate with the railroad directly to ensure the Contractor's Work and schedule does not impact railroad operations. The Contractor shall comply with railroad requirements when working within and adjacent to railroad property.

The Contractor shall coordinate a mutually acceptable construction schedule for elements of Work to be constructed by BNSF forces and give notice of the requirement for BNSF forces at least 12 months prior to the date of the Work required by railroad forces. The Contractor shall assume that BNSF will only mobilize its construction forces once for all the Work including mainline track construction and siding Work. The Contractor shall assume that no more than three concurrent track bulletins, commonly referred to as "Form B," will be issued in order to perform track work by BNSF between Fresno and Los Angeles. The Contractor shall further assume that BNSF track signal and construction duration will be 24 months from the day BNSF forces mobilize on site.



Approximate limits of the railroad relocation and reconstruction are:

- a. Realignment of Mainline – Sta WS1 5657+00 to Sta WS1 5829+00
- b. Relocated Siding – Sta WS1 5586+00 to Sta WS1 5609+00
- c. Removal of Spur – Sta WS1 5557+60 to Sta WS1 5565+00

#### **5.4 Roadway Construction**

Work within or affecting the State Highway System (SHS) or within the SHS ROW shall be coordinated with and performed per Caltrans requirements.

Work within or affecting local jurisdictions shall be coordinated with and performed per the requirements of the jurisdictional authorities.

Contractor shall employ the design speeds established by the Counties and Caltrans, as applicable.

Contractor shall design, construct and maintain temporary access roads for its needs and those that may be required by local jurisdictions and emergency response authorities. Contractor shall also design, construct and maintain permanent CHSR access roads required by the Project per the requirements of the Design Criteria and Directive Drawings. Contractor shall coordinate with the Authority Representative and local jurisdictions for the location of permanent access roads. Permanent access roads are required as indicated in the Design Criteria and shall coincide with the location of future CHSR wayside systems/operations facilities as shown on the Preliminary Engineering Documents. Additional permanent access roads may be required by emergency response authorities. Contractor shall coordinate the design of access roads through Interface Coordination and Design Integration Workshops with the Authority.

Lighting and landscaping of roadway facilities that are within Caltrans and other jurisdictional authorities shall be coordinated with and performed per the requirements of the jurisdictional authorities. Contractor shall refer to the MMEP in the Final Environmental Documents for additional landscaping requirements.

#### **5.5 Trackway**

Final horizontal and vertical alignments for the trackway shall be designed by the Contractor for the entire Project limits, including location of all special trackwork. The limits of track alignment shall extend beyond the Contractor's construction limits to the nearest point of tangency in plan and profile to ensure consistency, interface and integration requirements with future work and in full support of ultimate CHSR operations.

The Contractor's design of the track bed shall not preclude the eventual design and installation of either a ballasted or non-ballasted track sections listed in Table 1 below, unless local conditions warrant a more specific determination.



**Table 1: Contract Track Forms Table**

Contract Track Forms Table								
Alignment Information				Track Support Type	Length		Track Form	
Subsection	Begin Station	Subsection	End Station		Feet	Miles	Track Form	Feet
A1	4435+50.00	L1	5191+50.00	At-Grade	52,701	9.98	Ballast	80,014
L1	5191+50.00	L1	5225+40.00	Retained Fill	3,390	0.64		
L1	5225+40.00	L1	5227+80.00	Bridge	240	0.05		
L1	5227+80.00	L1	5271+60.00	Retained Fill	4,380	0.83		
L1	5271+60.00	WS1	5551+00.00	At-Grade	17,923	3.39		
WS1	5551+00.00	WS1	5556+40.00	Retained Fill	540	0.10		
WS1	5556+40.00	WS1	5557+60.00	Bridge	120	0.02		
WS1	5557+60.00	WS1	5564+80.00	Retained Fill	720	0.14	Slab	11,815
WS1	5564+80.00	WS1	5682+95.00	Viaduct	11,815	2.24		
WS1	5682+95.00	WS1	5709+50.00	Retained Fill	2,655	0.50	Ballast	19,705
WS1	5709+50.00	WS1	5716+02.00	At-Grade	652	0.12		
WS1	5716+02.00	WS1	5716+70.00	Bridge	68	0.01		
WS1	5716+70.00	WS1	5880+00.00	At-Grade	16,330	3.09		

If the Contractor proposes to revise the track form type set forth in Table 1, a revised table with the proposed track form configuration shall be submitted to the Authority for approval as part of the Design Baseline Report.

Specifically, at-grade sections and shorter aerial structures (less than 1,000 feet) shall be designed to accommodate ballasted track section. The Contractor shall account for the eventual design and construction of a non-ballasted track section for longer aerial structures (greater than 1,000 feet) and below-grade structures. Tracks adjacent to passenger platforms shall be designed for non-ballasted track.

The Contractor shall account for the long-term settlement criteria of the constructed trackway in the design and shall monitor the settlement of the constructed trackway to ensure conformity with the Design Criteria. The Contractor shall coordinate and implement track section homogeneity as well as operations and maintenance considerations through Interface Coordination and Design Integration workshops with the Authority.

Trackway shall include cut and fill, temporary protective layer and surface and underground drainage, with the exception of the underdrain system along the track bed. The installation of the underdrain system along the track bed will be performed by follow-on contractor(s).

For operations and maintenance considerations, universal crossovers between main tracks shall be located nominally 20 miles apart. Universal crossovers shall be capable of handling diverging moves at speeds of 80 mph. The Contractor shall coordinate locations of universal crossovers adjacent to construction packages.

## 5.6 Retaining Walls

The Contractor shall design and construct retaining walls necessary for the CHSR trackway, SHS and local roadways. Design and construction of retaining walls shall include the drainage system for the walls.



Soundwall locations will be determined after the construction of HSR infrastructure. The Contractor shall design all retaining walls/retained structures and connection method between the structure and soundwall to accommodate the installation of soundwalls by follow-on contractors.

## **5.7 Intrusion Protection Barriers**

Intrusion protection barriers shall be provided in accordance with the Design Criteria. Intrusion protection shall be included where required to protect the CHSR Operating Infrastructure from intrusion by automotive vehicles and/or railroad locomotives and cars per Design Criteria, railroad and Caltrans requirements. The location, design, construction and determination of the appropriate type of intrusion protection shall be the responsibility of the Contractor. Protection against intrusion of conventional trains shall satisfy Design Criteria which includes providing 102 feet or greater lateral separation between the closest HSR track centerline and freight/conventional railroad ROW.

At locations where the CHSR infrastructure will be located adjacent to an existing railroad and/or highway facility and an intrusion protection barrier is required, said barrier shall be located as close as possible to the ROW line that delineates the bounds between both entities. The intrusion protection barrier between the Authority and railroad shall be designed and constructed to ensure maintenance and constructability from within the Authority's ROW.

## **5.8 CHSR Bridges/Aerial Structures**

Contractor shall design and construct Primary Type 1, Primary Type 2, and secondary structures such as bridges, aerial structures and grade separations that are required for the Project in accordance with Design Criteria.

In addition to the Design Criteria, the following provisions shall also be followed:

Perform site specific site response analyses to develop final time series at the Special Sites using the site specific geotechnical data and using the response spectra and corresponding spectrally matched time series of the referenced rock outcrop motions developed by the Authority. Use the results for final design of bridges and aerial structures at the Special Sites. The site specific site response analysis shall include:

1. Characterization of site properties.
2. Statement of analysis methodology.
3. Presentation of the results of each component (H1/H2) of seven input ground motions.
4. Response spectra at different depths of interest (i.e., reference rock levels, pile tip, mid-depth of the pile, and ground surface).
5. Acceleration/Velocity/Displacement time histories at different depths of interest.
6. Displacement (or shear strain) profile for the entire depth.



## 7. Maximum shear stress profile with depth.

Grade separated structures owned by Third Parties to be built as part of the Project shall be designed and constructed in conformity with the requirements of said Third Parties. In the event of conflicting requirements between the Design Criteria and other standards and codes of practice, the more stringent requirements shall take precedence. Grade separated structures that span high-speed rail trackways or have the capability to influence operability of high-speed trains in the event of failure, shall be designed per provisions in the Design Criteria.

Soundwall locations will be determined after construction of HSR infrastructure. The Contractor shall design all Type 1 structures, including the parapet walls and connection method between the parapet and soundwall, to accommodate the installation of soundwalls by follow-on contractors.

Contractor shall design and place abutments, columns, walls and slopes of the Primary Type 2 structures outside the CHSR access-controlled ROW except in locations where the CHSR ROW is adjacent to another roadway and/or railroad ROW, columns or piers will be permitted within the CHSR ROW to allow the use of a multi-span structure and eliminate the need for an unnecessarily long span.

For Primary Type 2 structures spanning railroad ROW, access for the maintenance of the structures, including but not limited to, bearing replacement, expansion joint replacement and graffiti removal at abutments, columns and bents shall be provided outside the railroad ROW. Exceptions for placement of abutments, columns or piers within roadway or railroad ROW is subject to agreement with the railroad or the authority having jurisdiction over the roadway. These abutments, columns or piers shall be placed as close to the CHSR ROW line as practicable, but allow for maintenance outside the railroad ROW when adjacent to a railroad. In all cases, abutments of the Primary Type 2 structures shall be placed so the faces of the walls are aligned with the CHSR access-controlled ROW line to allow for maintenance access.

Contractor shall make an independent interpretation of the geotechnical information from previous site investigations, and shall carry out such additional geotechnical and subsurface investigations and surveys as are necessary to design and construct the grade separated structures or other elements of the Project, in conformity with the Contract requirements.

## 5.9 Drainage

Contractor is responsible for the design to accommodate the full build-out of CHSR trackway and facilities. However, in lieu of constructing CHSR track bed underdrains (closed drainage system) and the drainage system inside the CHSR trench or tunnel sections, Contractor shall design and construct a temporary drainage system for CHSR track bed and trench or tunnel sections to accommodate the drainage of these facilities until the follow-on contractor installs the final drainage system designed by the Contractor. The temporary drainage system shall not require reconstruction of any structural elements during follow-on contracts by others. Contractor shall design and construct all other permanent drainage systems, such as drainage laterals, to ensure the successful drainage of the Project in the interim and final conditions, complete in place.





Contractor is responsible for the design and construction of permanent drainage systems for Third Party facilities being impacted by the Project.

At locations where the CHSR will be located adjacent to an existing railroad and/or highway facility, a separate drainage system shall be designed and constructed to capture the runoff from each facility independently. The drainage system for each entity (Authority or Third Party) shall be located within its ROW. Contractor shall also reference intrusion protection barrier location requirements as noted elsewhere in this Scope of Work.

#### **5.9.1.1 Reliability of the Drainage Subsystem**

Each pump station site shall be designed to accommodate a redundant set of pumps and control equipment in the full build-out condition upon installation by others of track and systems.

### **5.10 Utilities**

Contractor shall ensure that existing and planned future utilities are not in conflict with CHSR, State, and local improvements. Contractor shall relocate and/or protect the existing utilities in accordance with the requirements specified in the Special and General Provisions, Design Criteria and the requirements of utility owners and local jurisdictions. Contractor shall coordinate with local jurisdictions and the utility owners throughout the Project and shall design and construct the relocation of utilities in conflict with the Project, including future CHSR facilities to be designed and constructed by others (i.e., relocation of existing overhead utilities that will conflict with future design and installation of CHSR OCS). Contractor is responsible for protection of utilities to remain in place during and after the performance of the Work.

Contractor shall design and install spare conduits and manholes for future use by communications companies as outlined below. The conduits shall terminate in manholes with pull ropes. The manholes shall be on both sides and outside the Authority's ROW.

1. Four 4-inch spare conduits in addition to sufficient number of conduits installed to underground aerial communication lines or installed in grade separation structures.
2. Six 4-inch conduits under Authority's ROW at existing public road crossings when there are no existing communication facilities and the public road will be closed and not grade separated.
3. Four 4-inch conduits in roadway overhead structures constructed by the Contractor when there are no existing communication crossings.
4. Six 4-inch conduits at intervals no less than every five miles.

Agreements executed to date between the Authority and utility owners are included in Book II, Part B. Contractor shall support the Authority for utility relocation agreements that may need to be finalized and/or executed for the Project.

Contractor is responsible for providing temporary utilities required for the performance of its work.



### **5.10.1 Utilities Register**

The Contractor shall prepare and submit a register of all utilities located, relocated or installed as part of the general works in accordance with the Asset Information Requirements Manual. The register shall fully reflect the final, completed as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. The Contractor shall submit electronic files of the utilities register in accordance with the Asset Information Requirements Manual.

### **5.11 Grounding and Bonding**

Contractor is responsible for design, installation and testing, which include providing the testing procedures for acceptance of all grounding and bonding for the facilities it is constructing, and shall install provisions for grounding and bonding of facilities constructed by third party or future contractors, per the requirements of Attachment 3 (Scoping Typical Sections), Attachment 4 (Scope Elements Matrix), Design Criteria and Directive Drawings.

Grounding and bonding testing shall include procedures to demonstrate the following requirements:

- a. Prior to superstructure unit grounding plates being bonded to grounding plates on columns or abutments, the Contractor shall demonstrate the ground resistance, measured at each grounding plate on columns and abutments, as 25 ohms or less. Where the ground resistance is greater than 25 ohms, the Contractor shall install additional grounding measures to achieve this value.
- b. Prior to superstructure unit grounding plates being bonded to grounding plates on columns or abutments, the Contractor shall demonstrate electrical continuity between the grounding plates on each superstructure unit.
- c. The Contractor shall connect the grounding plates at one end of the superstructure unit only to the grounding plates at the top of one column or abutment only and shall demonstrate the grounding resistance of the longest electrical circuit is equal to or less than 25 ohms. Where the ground resistance is greater than 25 ohms, the Contractor shall install additional grounding measures to achieve 25 ohms.

### **5.12 Access Control**

Contractor shall design, construct and maintain permanent access control including fences, gates, walls and doorways within the limits of the entire Authority ROW, except access roads.

### **5.13 Low Voltage Systems, Underground and Undertrack Ductbank and Manholes**

Contractor shall refer to and coordinate between Design Criteria, Preliminary Engineering Documents and Directive Drawings to locate, design and install underground and undertrack ductbanks and supporting manholes for future CHSR systems facilities along the Authority ROW, as delineated in Attachment 4 (Scope Elements Matrix) and shown on the Preliminary Engineering Documents. Final locations and designs for the underground and undertrack





conduit ductbanks shall be coordinated with the Contractor at the Interface Coordination and Design Integration Workshops with the Authority.

#### **5.14 25kV Traction Power Underground Ductbank and Manholes**

Contractor shall refer to and coordinate between the Design Criteria, Preliminary Engineering Documents and Directive Drawings to locate, design and install underground ductbanks and supporting manholes for future CHSR Traction Power Facilities that are located away from the Authority ROW. Final locations and designs for the underground conduit ductbanks will be coordinated with the Contractor through the Interface Coordination and Design Integration Workshops with the Authority.

#### **5.15 Temporary Lighting and Pumps**

Contractor shall be responsible for design and installation of temporary lighting and pump facilities for the Project. Contractor shall leave the temporary lighting and pump facilities for trenches and tunnels in place after completion of the Contract.

#### **5.16 Durability**

Contractor shall prepare Design and Construction Specifications to meet the Design Life and Durability goals of various elements of the Project as stated in the Design Criteria. Contractor shall submit documentation indicating how Design and Construction Specifications meet the requirements of the Design Criteria to the Authority or its designated representative for concurrence. Upon review, the Authority will issue one of the three dispositions described in the VV&SC Requirements. The documentation shall include analysis, engineering data or research and test reports, as applicable.

The documentation shall cite which Design and Construction Specifications requirements and which design details address specific Design Life and Durability issues. The documentation shall explain Design and Construction Specifications provisions that address Design Life and Durability issues for typical elements in specific locations and environments. The documentation shall demonstrate compliance with applicable industry standards and guidelines.

#### **5.17 Maintenance Access**

Direct access shall be provided for maintenance personnel to walk from train control, communications and traction power facilities to the area immediately adjacent to the main tracks. Stairs shall be provided for maintenance personnel to negotiate changes in elevation, except in areas where slopes are equal to or flatter than 2 horizontal to 1 vertical.

In locations where train control, communications and traction power facilities are separated from the trackway by a roadway, traffic control devices shall be provided to allow maintenance personnel to safely walk across the roadway. A maintenance vehicle pullout shall be provided adjacent to the HSR mainline ROW, opposite the facility. Refer to Caltrans Standard Plans for maintenance vehicle pullout details.

Maintenance access shall be accessible in all locations via driving gates.

